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(54) Drying or washing/drying machine comprising a door containing means for generating steam for treating laundry items

(57) A drying or washing/drying machine comprising means for generating steam for treating laundry items, means for drying laundry items, a tub for containing the laundry items, a door (2) for closing the tub, a reservoir (3,3') for a liquid to be vaporized, associated with the door, wherein the steam generating means are associated with the door (2), thus avoiding the use of flexible hydraulic connections between said steam generating means and the reservoir (3,3').

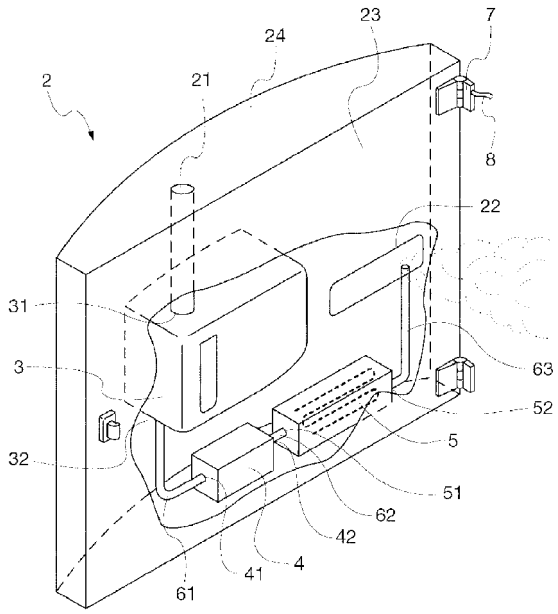

Fig. 2

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Description

[0001] The present invention relates to a drying or washing/drying machine comprising means for generating steam for treating laundry items.

[0002] As known, a steam treatment allows disinfecting the laundry items by reducing the bacterial charge thereof. In addition, during the drying cycle such a treatment allows stretching the fabrics, which would otherwise turn out wrinkled at the end of the process.

[0003] This type of treatment is widely used at industrial level, but its use in a household environment requires taking into account the fact that maintenance will have to be carried out by users having lower technical skills and that the machine must be offered at an affordable price.

[0004] In order to reduce the technical skills required for maintaining a machine comprising steam treatment means, document EP 1975302 AI to FagorBrandt SAS describes a solution (shown in Fig. 1 of the present application) which allows positioning a reservoir for water to be vaporized inside a door of the drying or washing/drying machine, so as to make it more easily maintained and/or used; such a solution employs hydraulic connections, typically hoses, for putting the reservoir of the water to be vaporized in fluidic communication with vaporization means arranged within the machine cabinet.

[0005] A known problem caused by this solution is that the hydraulic connections might fail due to fatigue phenomena caused by the door opening/closing movement.

[0006] The present invention aims at solving this and other problems by providing a drying or washing/drying machine which comprises means for generating steam for treating laundry items, as set out in the appended claim 1.

[0007] The idea at the basis of the present invention is to associate steam generating means with a door of the machine, so as to limit the connections between the door and the cabinet to electric connections only, which are less subject to damage due to fatigue phenomena.

[0008] Further advantageous features of the present invention will be set out in the appended claims. These features as well as further advantages of the present invention will become more apparent from the following description of an embodiment thereof as shown in the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig. 1 is a perspective view of a section of the machine described in document EP 1975302 A1 to FagorBrandt SAS;

Fig. 2 is a perspective view of a door according to the invention;

Fig. 3 is a perspective view of a first variant of the machine according to the invention.

[0009] With reference to Fig. 2, a drying or washing/drying machine (not shown in the drawings) comprises means for generating steam for treating laundry items, means for drying the laundry items, a tub for containing the laundry items (not shown in the drawings), preferably containing a rotary drum (not shown in the drawings), a door 2 for closing the tub, a reservoir 3 for a liquid to be vaporized, preferably water, positioned inside said door 2; said tub has an aperture (not shown in the drawings) for loading laundry items, preferably at the front, and can be sealingly closed by means of the door 2. Moreover, the tub is contained inside a cabinet (not shown in the drawings), preferably shaped like a parallelepipedon, which protects the components of the drying or washing/drying machine.

[0010] The door 2 is hinged to the tub or to the cabinet, so that it can be easily opened and reclosed. The door 2 comprises steam generating means, preferably integral therewith and arranged therewithin.

[0011] In this example, the steam generating means comprise a pump 4, a steam generator 5 and a steam exhaust 22; wherein said exhaust 22 preferably comprises an aperture on a wall 23 of the door 2, which faces the inside of the tub.

[0012] The reservoir 3 comprises an inlet 31 and an outlet 32, respectively positioned at the top and bottom of said reservoir 3; said reservoir can be filled through an aperture 21, preferably located on a top wall 24 of the door 2, which aperture is in fluidic communication with the inlet 31 of the reservoir 3.

[0013] The pump 4 comprises an intake duct 41 and a delivery duct 42, and is preferably and advantageously arranged underneath the bottom of the reservoir 3.

[0014] The heater 5 comprises an inlet 51, an outlet 52 and heating means, preferably of the electric type, which can vaporize a water flow.

[0015] When the heater 5 is in operation, the water taken in through the inlet 51 is transformed into steam, which is then expelled through the outlet 52.

[0016] The outlet 32 of said reservoir 3 is in fluidic communication with the intake duct 41 of the pump 4 by means of a tube 61, preferably a flexible one, whereas the delivery duct 42 of the pump 4 is in fluidic communication with the inlet 51 through a tube 62 similar to the tube 61. The outlet 52 of the heater 5 is in fluidic communication with the steam exhaust 22 of the door 2 through a steam duct 63, thus feeding steam into the tub.

[0017] When a configuration of this type is used, the door 2 only requires power supply for the pump 4, the heater 5 and any control electronics; said power can be easily supplied through a hinge 7 that comprises a cavity in which one or more wire pairs 8 can be routed. Advantageously, maintenance of the steam generating means can thus be carried out by simply acting upon the door 2, without having to open the machine cabinet. In addition, this solution allows adding steam generating means to a drying or washing/drying machine lacking such means, without necessarily having to partially or totally re-design the whole machine.

[0018] When the steam generating means of the drying

or washing/drying machine according to the present invention are in operation, the water (preferably demineralized water and/or water containing an additive) poured into the reservoir 3 by the user is allowed to flow towards the pump 4 through the tube 61 and is then pumped into the heater 5, where it is vaporized and exits through the tube 62; finally, the steam is exhausted into the tub through the steam exhaust 22 by means of the steam duct 63.

[0019] Of course, the main example described so far may be subject to many variations.

[0020] A first variant is shown in Fig. 3; for simplicity, the following description will only highlight those parts which make this and the next variant different from the above-described main embodiment; for the same reason, wherever possible the same reference numerals, with the addition of one or more apostrophes, will be used for indicating structurally or functionally equivalent elements.

[0021] In this first variant, the steam generating means of the drying/washing machine comprise nebulization/atomization means capable of nebulizing/atomizing the water coming from a reservoir 3', which is similar to the reservoir 3 of the previous example. Therefore, the water is nebulized directly inside the tub, where vaporization is caused by the heat generated by the drying means.

[0022] The nebulization/atomization means comprise a high-pressure pump 4' and at least one nebulization/atomization nozzle 9'.

[0023] The high-pressure pump 4' comprises an intake duct 41' and a delivery duct 42'; said pump 4' can generate a pressure in the range of 50 to 200 bar, preferably 100 to 150 bar, in the delivery duct.

[0024] The intake duct 41' is in fluidic communication with the reservoir 3' through a tube 61' similar to the tube 61 of the preceding variant, whereas the delivery duct 42' is in fluidic communication with the nozzle 9' through a high-pressure duct 64'.

[0025] Furthermore, the atomization means also comprise an air/water mixer (not shown in the drawings) arranged between the reservoir 3' and the intake duct 41' of the pump 4', if mist generation is required.

[0026] The nozzle 9' is in fluidic communication with the tub, and is preferably positioned with its axis substantially perpendicular to a wall 23' (similar to the wall 23 of the previously described variant) of the door 2 which faces the inside of the tub.

[0027] When the steam generating means of the drying or washing/drying machine according to the invention are in operation, the water (preferably demineralized water) poured into the reservoir 3' by the user is allowed to flow towards the pump 4' through the tube 61' and is then pumped through the high-pressure duct 64' into the nozzle 9', through which it is then nebulized/atomized into the tub. Finally, the nebulized water or mist thus produced is vaporized inside the tub of the drying or washing/drying machine by the heat generated by the laundry drying means.

[0028] Of course, the example described herein may be subject to further variations, which will nonetheless still fall within the scope of the following claims.

Claims

1. A drying or washing/drying machine comprising means for generating steam for treating laundry items, means for drying the laundry items, a tub for containing the laundry items, a door (2) for closing the tub, a reservoir for a liquid to be vaporized (3,3'), associated with the door,
characterized in that
the steam generating means are associated with the door (2), thus avoiding the use of flexible hydraulic connections between said steam generating means and the reservoir (3,3').

2. A machine according to claim 1, wherein the steam generating means are integral with the door (2).

3. A machine according to any one of claims 1 or 2, wherein the steam generating means comprise a pump (4,4') with which an intake duct (41,41') and a delivery duct (42,42') are associated, and wherein said intake duct (41,41') is in fluidic communication with the reservoir (3,3').

4. A machine according to any one of the preceding claims, wherein the pump (4,4') is positioned underneath the bottom of the reservoir (3,3').

5. A machine according to any one of claims 3 or 4, wherein the steam generating means comprise a steam generator (5), and wherein the liquid coming from the reservoir (3) is pumped by the pump (4) into said steam generator (5) to be transformed into steam, and is then fed into the tub through a steam exhaust (22), the latter being in fluidic communication with the tub and with the steam generator (5).

6. A machine according to claim 5, wherein the steam exhaust (22) comprises an aperture located on a wall (23) of the door (2), and wherein said wall (23) faces the inside of the tub.

7. A machine according to any one of claims 3 or 4, wherein the steam generating means comprise nebulization/atomization means comprising the pump (4') and a nozzle (9'), and wherein the delivery duct (42') is in fluidic communication with the nozzle (9'), which in turn is in fluidic communication with the tub, said nebulization/atomization means being capable of nebulizing/atomizing the water coming from the reservoir (3') inside the tub, causing the nebulized/atomized water to be vaporized inside the tub due to the heat generated by the drying means.

8. A machine according to claim 7, wherein the nozzle (9') is positioned with its axis substantially perpendicular to a wall (23') of the door (2) which faces the inside of the tub.

9. A machine according to claim 8, wherein the pump (4') is a high-pressure pump and can generate a pressure between 50 and 200 bar within the delivery duct (42').

10. A machine according to any one of claims 7 to 9, wherein the nebulization/atomization means also comprise an air/water mixer arranged between the reservoir (3') and the intake duct (41') of the pump (4'), so that mist can be generated downstream of the nozzle (9').

11. A machine according to any one of the preceding claims, wherein the reservoir (3,3') is filled through an aperture (21).

12. A machine according to claim 11, wherein the aperture (21) is positioned on a top wall (24) of the door (2).

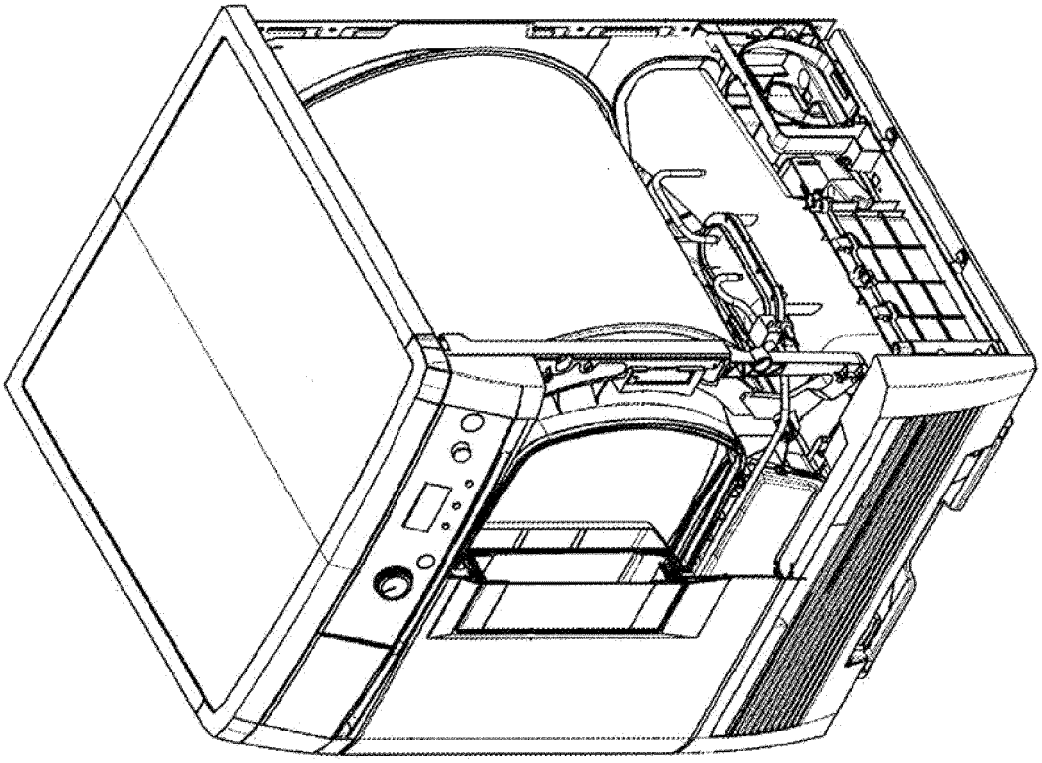

Fig. 1

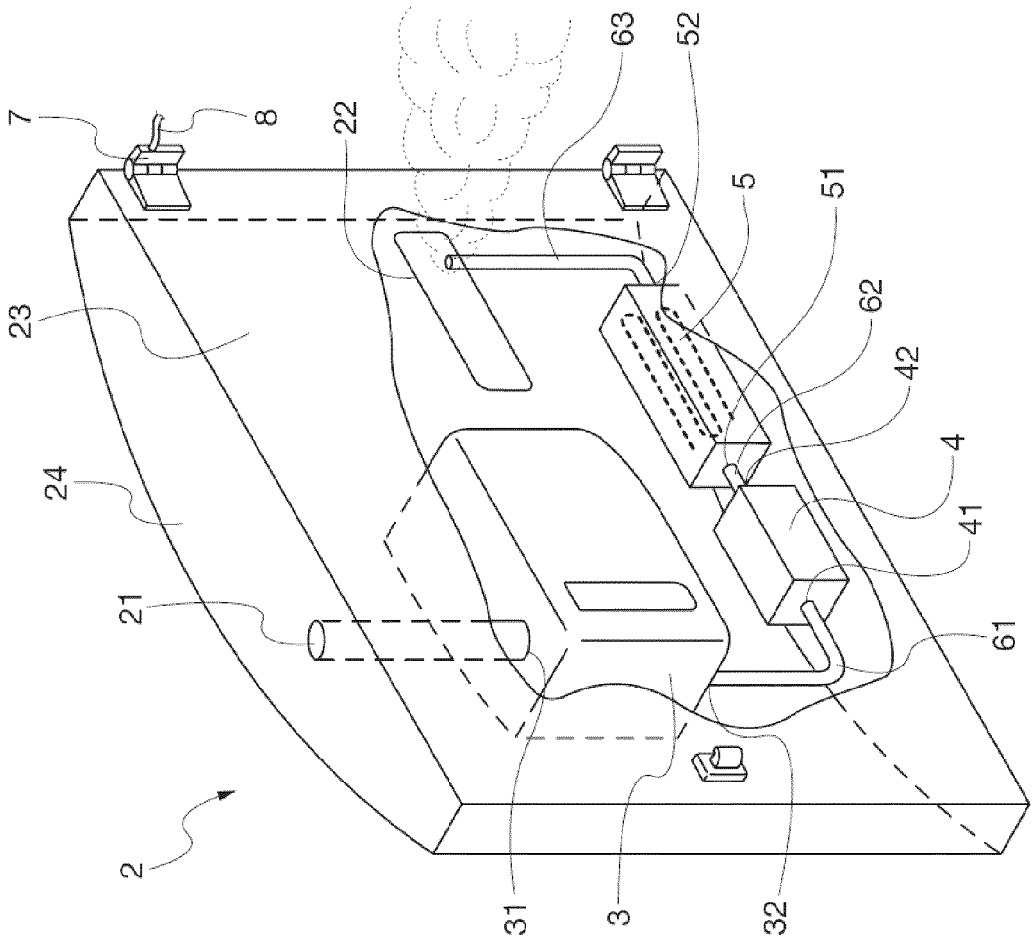

Fig. 2

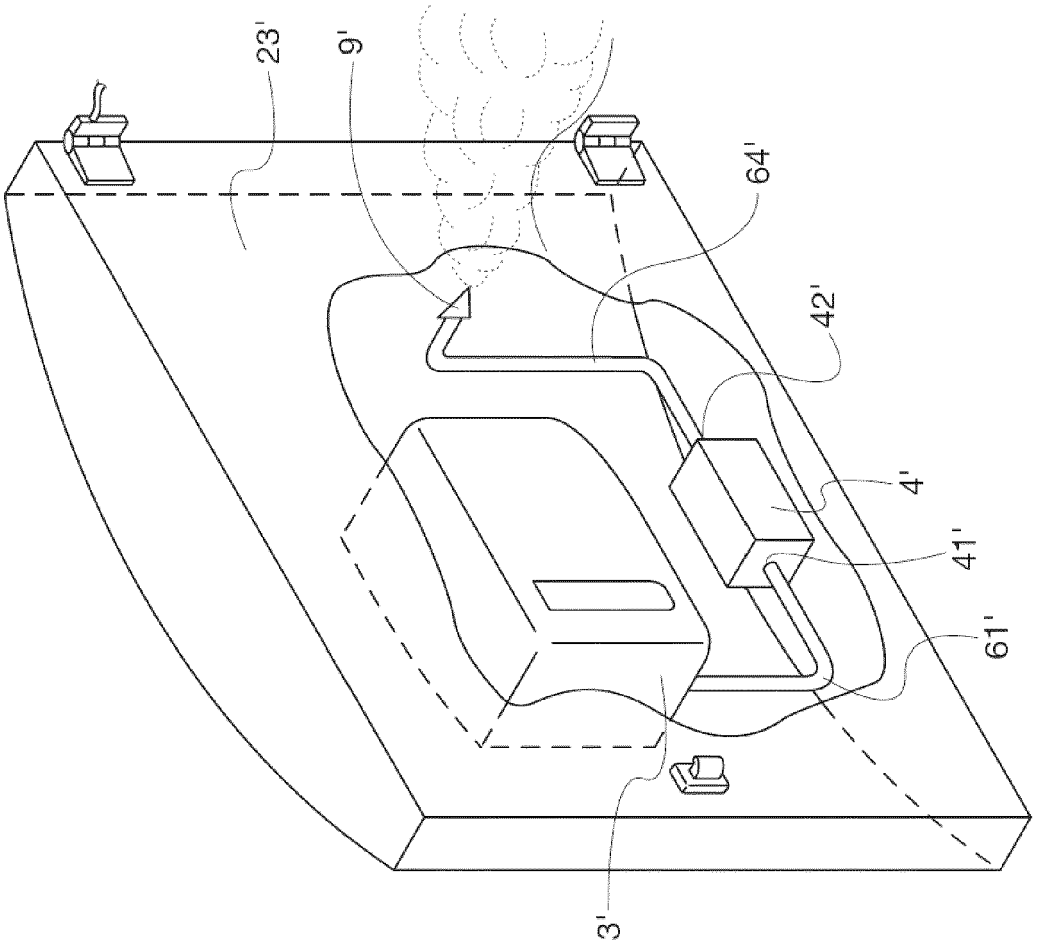

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 12 18 2414

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 1 975 302 A1 (FAGORBRANDT SAS [FR]) 1 October 2008 (2008-10-01) * the whole document *	1-12	INV. D06F58/20 D06F39/00
A	KR 2006 0023017 A (LG ELECTRONICS INC [KR]) 13 March 2006 (2006-03-13) * abstract *	1-12	
A	JP 61 128995 A (SANYO ELECTRIC CO) 17 June 1986 (1986-06-17) * abstract *	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 December 2012	Jezierski, Krzysztof

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 18 2414

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-12-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1975302 A1	01-10-2008	AT 472006 T	15-07-2010
		EP 1975302 A1	01-10-2008
		ES 2347925 T3	25-11-2010
		FR 2914322 A1	03-10-2008
KR 20060023017 A	13-03-2006	NONE	
JP 61128995 A	17-06-1986	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1975302 A1, FagorBrandt SAS **[0004] [0008]**